353

Chemical Burn Injuries

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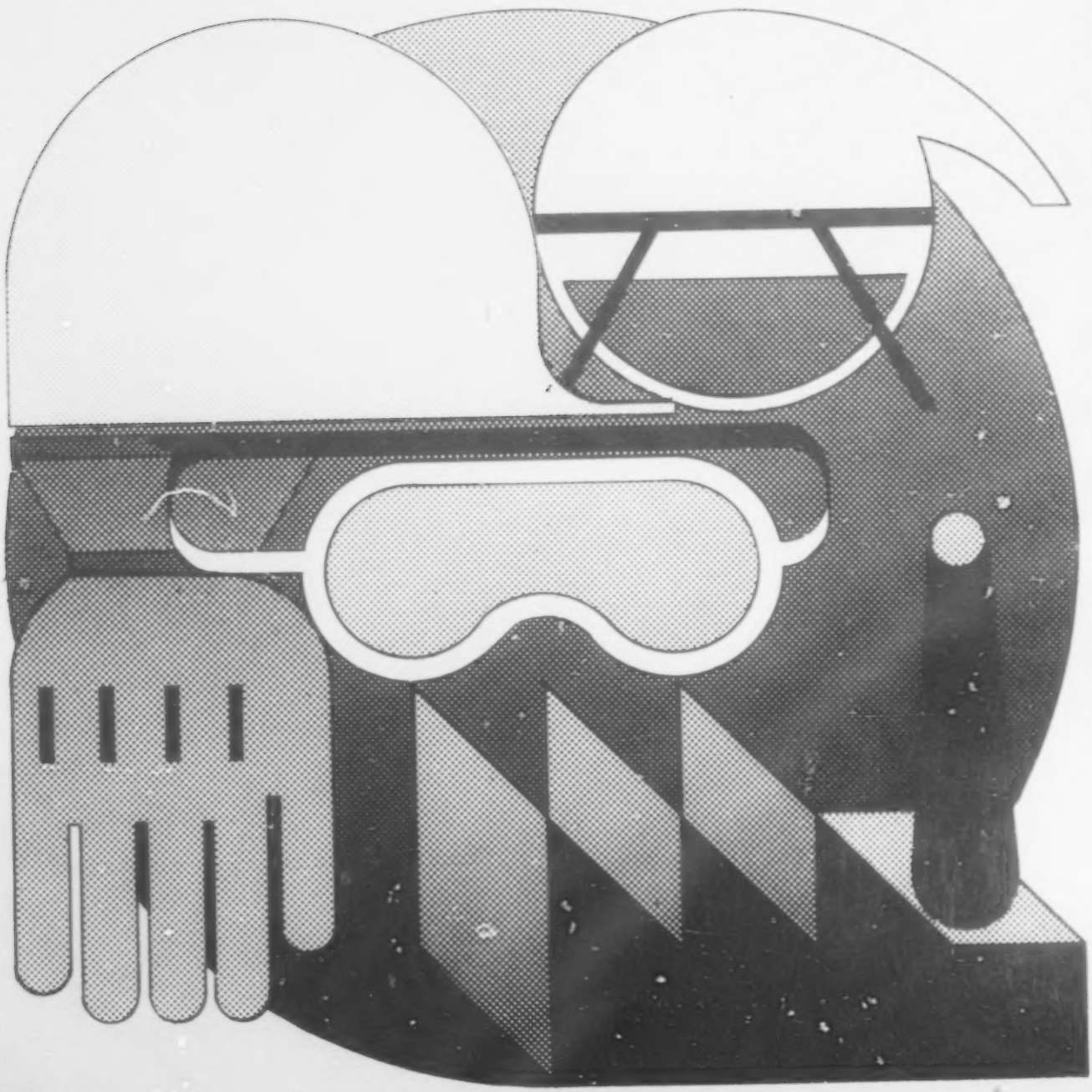

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U.S. Department of Labor
Elizabeth Dole, Secretary

Bureau of Labor Statistics
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Preface

This bulletin summarizes the results of a May 1985 survey of workers who suffered job-related chemical burns. Tabulations (without analysis) were issued in mid-1987. The findings of the survey have been of assistance to the Occupational Safety and Health Administration (OSHA) in developing safety standards, compliance strategy, and training programs for reducing work-related injuries. Several OSHA offices, as well as the Office of Safety Research of the National Institute for Occupational Safety and Health, contributed to the planning of the survey.

The survey was conducted by the Bureau's Office of Safety, Health and Working Conditions in cooperation with the following States: Alaska, California, Colorado, Delaware, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Missouri, Nebraska, New Mexico, North Carolina,Ohio, Oregon, Tennessee, Texas, Utah, Virginia, Washington, Wisconsin, and Wyoming. BLS regional offices coordinated State survey operations. Norma W. Carlson of the BLS Division of Safety and Health Statistics analyzed the survey data and prepared this bulletin.

The survey was not designed to yield national estimates nor was the collection period intended to represent the entire year of 1985. Therefore, caution should be exercised in extrapolating the data to population or annual estimates. For a discussion of the scope of the survey, limitations of the data, and reliability of estimates, see appendix A.

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A list of work injury reports published since 1978 appears at the end of this bulletin.

Contents

Page

Introduction 1
Survey results 1

Tables:

Chemical burn injuries, selected States, May 1985:

1. Industry classification of worker 4
2. Occupational classification of worker 5
3. Age and sex of worker 8
4. Type of accident 8
5. Source of injury 9
6. Part of body affected 10
7. Activity at time of accident 11
8. Description of accident 12
9. Estimated days away from work 13
10. Length of hospitalization required 13
11. Type of personal protective equipment worn by worker 14
12. Use of personal protective equipment 15
13. Practice and policy regarding personal protective equipment 17
14. Conditions or factors contributing to accident 18
15. Accident prevention 18

Appendixes:

A. Scope and method of survey 19
B. Participating State agencies 21
C. Survey questionnaire 22

Chemical Burn Injuries

Introduction

As part of its ongoing effort to minimize exposure to chemical hazards in the workplace, the Occupational Safety and Health Administration (OSHA) requested the Bureau of Labor Statistics to conduct a small, in-depth study of job-related chemical burns.[1] In response, BLS and 23 participating State agencies identified about 800 chemical burn cases filed as workers' compensation claims in May 1985, the reference month selected for this study.

The claims reports contain information on the injured worker (such as age, sex, and occupation) and on the characteristics of the case (specific chemical or other source of injury and part of the body burned).[2] To supplement these reports, a BLS questionnaire asked the injured worker for more details on the accident, including specific work activity at the time of injury, availability of emergency treatment, and injury severity (defined as days away from work or nights hospitalized, or both).

OSHA's interest in the chemical burn study has focused on the use and effectiveness of personal protective equipment (particularly safety gear for the eyes) and the extent of employee awareness of hazards associated with handling chemicals. On the first issue, about two-thirds of the workers in the study indicated that they were not wearing safety gear. Those who were wearing some type of protective device often said that the chemical passed under or around the safety gear—usually glasses, goggles, or face shields.

When asked whether they were aware of the potential hazards of chemicals on their job, three-fifths of the survey participants replied that they had not been so informed; moreover, two-thirds indicated that information on wearing chemical-resistant protective garments or gear was not provided. As for accident prevention, the workers cited the need for better personal protective equipment, more safety training, better labeling, and stricter enforcement of safe work procedures.

In the interim between the collection and preliminary release of these data and the publication of this final report, OSHA has issued a directive known as the Hazard Communication Standard. This directive, which focuses on the broad issue of chemical exposure, was implemented in stages between May 1986 and March 1989.[3] The standard requires employers to transmit information to their employees on the hazards of chemicals, by means of labels on containers, material safety data sheets, and special training.

Survey results

Industry classification and occupation. While burn cases occurred in all major industry groups, such injuries were clustered in four classifications: *Construction*, 12 percent; *manufacturing*, 33 percent; *retail trade*, 14 percent; and *services*, 19 percent (table 1). Industries with 5 percent or more of the cases included special trade contractors; manufacturers of food, chemicals, and fabricated metals; wholesale trade in nondurable goods; automotive dealers and service stations; and health services.

A similar pattern of concentration emerged in classifying injured workers by occupation (table 2). Almost two-thirds of the burn cases involved workers in five major job categories: Food services and building services (mostly cooks, janitors, and maids); mechanics; construction trades; operators of various types of machines; and laborers at construction sites and elsewhere. Not unexpectedly, white-collar workers, who constitute somewhat over one-half of the Nation's employed, accounted for a relatively small proportion (one-tenth) of chemical burn cases.

Sex and age of worker. Workers who incurred chemical burns were predominantly men (83 percent) and relatively young (72 percent were under 35 years of age) (table 3). By comparison, slightly over one-half of the general working population were men, and almost one-half were under 35 years old.

Type of accident. Virtually all workers were burned when

[1] For purposes of this study, a chemical burn results from a chemical's contact with the surface of the face, eye, or other external parts of the body. On contact, some materials, such as alkalies, remove the natural oils from the skin, thus resulting in irritation and ulceration of the area. A harsher agent, such as sulfuric acid, takes water out of the skin and generates heat, thus causing severe burning on contact. Excluded from the study were burn cases caused by inhalation or ingestion.

For greater detail on chemicals and other hazardous substances, see the National Safety Council's *Accident Prevention Manual for Industrial Operations*, 7th ed., 1974, ch. 37 and 39.

[2] BLS work injury reports follow the categories of the American National Standards Institute for classifying accidents or illnesses: Nature, part of body, source, and type. To illustrate, the Bureau's report on back injuries associated with lifting highlighted a type of accident—lifting—that commonly occurs to a specific part of the body—the back. Type of accident and source of injury provided the framework for the BLS report on falls on stairs. This current study is the first to focus on the "nature" of the accident—chemical burns. A similar work injury report on heat burns is forthcoming.

[3] For the full text of the Hazard Communication Standard, see 29 CFR 1910.1200. Implementation was scheduled in three stages: May 1986 for manufacturing; August 1988 for nonmanufacturing, except construction; and March 1989 for construction.

they came in direct contact with radiation, caustics, or toxic and noxious substances (table 4). The handful of remaining chemical burn cases resulted from explosions involving hazardous substances; most explosion accidents involved motor vehicle mechanics and truckdrivers. (Excluded from the study were burn cases caused by inhalation or ingestion of harmful substances.)

Source of accident. Chemicals or chemical compounds were the agents precipitating 95 percent of the burns. Coal and petroleum products, primarily gasoline, accounted for the remaining burn incidents. A score or more of specific chemicals or chemical compounds were identified by the injured as the source of their burns (table 5). Of the agents named, four accounted for over three-fifths of the injuries: Acids, 20 percent; alkalies, 20 percent; soaps, detergents, and cleaning compounds, 14 percent; and solvents and degreasers, such as paint-related products, 9 percent.

Sulfuric acid (including battery acid), accounting for two-fifths of the acid-related burns, was frequently cited by motor vehicle and heavy equipment mechanics.

Two substances accounted for nine-tenths of the alkali-related burns: (1) calcium hydroxide (found in plaster, mortar, and cement), the primary source of burns suffered by construction laborers; and (2) sodium or potassium hydroxide (often found in drain cleaning and other cleaning solutions), a major agent in cases involving food service and building service workers.

Part of body. Burns to the eyes accounted for one-half of the injuries (table 6).[4] Other major body parts affected included the upper extremities (one-fifth of the cases) and the lower extremities (slightly over one-eighth).

The three main sources of burns to the eye were: (1) soaps, detergents, and cleaning compounds; (2) acids (mainly sulfuric); and (3) alkalies (chiefly sodium or potassium hydroxide). Alkali-induced injuries appear to pose a greater threat than acids, especially if the eye is not immediately irrigated after contact with the chemical. Once an alkali penetrates the tissue of the eye, it can damage the deeper ocular structures. Acids also can destroy eye tissue, but changes occur less rapidly because proteins in the eye surface have a buffering effect on the action of the acid.[5]

Description of the accident. Nearly two-thirds of the workers were injured while cleaning and otherwise servicing equipment, tools, or vehicles (table 7). About one-fourth suffered burns when transferring, unloading, or storing chemicals and hazardous substances.

In over four-fifths of the cases studied, the *chemical contacted the worker* when he or she was actually working with it; that is, was either pouring, spraying, pumping, or applying it by dipping or rubbing (table 8). Often the accident occurred while the worker was lifting and/or carrying a container or other object holding the chemical or substance. In the course of these activities, the material splashed, sprayed, or dripped on the worker.

In about one-tenth of the cases (chiefly involving food and building service workers and machine operators), the *worker touched or contacted* the chemical or substance when kneeling or placing a hand in the solution.

Extent of awareness of chemical hazards. The injured workers were accustomed to using the material that burned them. Nearly three-fifths said they worked with or near the agent daily or almost daily; and one-tenth, about once a week (table 7). In one-eighth of the cases, the accident happened the first time the worker used the chemical or substance. When asked whether they had been informed about chemical hazards at their workplace, three-fifths of the workers replied that they had received no written or printed instructions from their employers on safety measures or procedures (table 7).

Emergency treatment. The estimated length of time the chemical or substance remained on the skin (or in the eyes) ranged from less than 1 minute to 30 minutes or more (table 8). (One-sixth of the injured could not remember the duration of exposure.) Two-fifths of the injured recalled that exposure time was 5 minutes or less; one-fifth put it at 5 to 30 minutes; and one-fourth, at 30 minutes or more.

Information was collected on the availability and proximity of treatment facilities at the jobsite (table 8). According to four-fifths of the respondents, emergency treatment facilities, such as eyewashes and deluge showers, were available. In workplaces with such facilities, one-third of the injured workers were within 10 feet of treatment; slightly more than one-third, within 10 to 50 feet; and one-fifth, 50 feet away or more (table 8).

Severity of injury. The number of days lost from work and the extent of hospitalization ranged widely (tables 9 and 10). Forty-five percent of the injured workers remained at work despite their accident. The majority, however, experienced lost worktime—7 days per case on the average. Hospitalization was required in a small fraction of the accidents; the average length of hospital stay was 6 nights.

The distribution of lost-workday cases varied by the part of the body that was burned, as shown in text table 1. Burns to the lower extremities accounted for the most severe cases, defined as those resulting in at least 26 days away from work.

[4] A work injury report on accidents involving eye injuries (BLS Report 597, April 1980) found that 20 percent of the eye injuries were caused by contact with chemicals.

[5] Two articles in *Occupational Health and Safety*, published by Medical Publications, Inc., Waco, Texas, provide useful information on chemical-induced eye injuries and the need for prompt emergency treatment: Frank R. Burns, M.D., and Christopher A. Paterson, Ph.D., D.Sc., "Prompt Irrigation of Chemical Eye Injuries May Avert Severe Damage," April 1989, pp. 33-36; and Theodore J. Ziegler, "Interested in Saving Face? Emergency Washes May Be the Answer," March 1989, pp. 26-29.

Text table 1. Percentage distribution of lost-workday cases by part of body affected

Part of the body	Percent of cases involving—			
	No lost workdays	1 to 5 days	5 to 10 days	10 days or more
Eyes	55	31	9	5
Upper extremities	49	23	14	14
Lower extremities	25	25	15	35

Personal protective equipment. Two-thirds of the injured workers reported that they were wearing personal protective equipment at the time of their accident (table 11). However, only about three-tenths of the injured said they were wearing *chemical-resistant* equipment, usually gloves, boots, jackets, or glasses. The items identified by the workers as resistant to chemicals were usually made of rubber or plastic. The nonresistant fabrics typically were leather, cotton, synthetics, or blends.

Three-fourths of the injured said their burn area was not covered by protective equipment at the time of their accident. The workers gave various reasons for the absence of protection (table 12). Frequently, they did not think protection was needed. In other instances, the workers said that proper equipment was not provided by the employer. (One-fifth gave no reasons for lack of coverage on the burn area.)

Of the 206 workers (26 percent) who reported that the area burned was covered at the time of the accident, about half identified the safety gear as "chemical-resistant." Nevertheless, the chemical came in contact with their skin or eyes, indicating problems with the gear that were not directly related to its chemical-resistant properties. The next responses were enlightening: Four-fifths of the workers said the chemical or substance "passed under or around" the protective equipment—usually glasses, goggles, or face shields. They added that, in many instances, the gear was in bad condition, did not fit properly, or was not designed to protect against chemical burns.

The workers whose burn areas were covered at the time of the accident also were asked to evaluate the effect the protective equipment had on the extent of injury. Two-fifths felt that the equipment had no effect on their burn; three-tenths said the equipment reduced the seriousness of the burn or the size of the burn area. However, slightly over one-fourth felt that the equipment made their burn more serious than it might have been; they reasoned that the gear lengthened the exposure time to the chemical or substance. In many of these cases, the worker was wearing gloves or boots, and, as one worker responded, the gear worsened the burn "by holding the acid on the skin."

Information was sought from all workers in the study on whether they had been told about using or wearing chemical-resistant personal protective equipment: Two-thirds said they had not been informed (table 13). Those who had been alerted indicated that their supervisors, employers, or safety supervisors usually gave them such information. Typically, the policy was for employers to pay for the entire cost of the protective equipment. About one-fifth of the workers, though, said they paid for the equipment or shared the cost with their employers.

Working conditions. A clear majority of the injured workers felt that worksite conditions did not contribute to their accident (table 14). But those who believed otherwise cited a number of contributing conditions, including limited work space, equipment in bad condition, and no warning of hazardous substances in the work area. Besides worksite conditions, most workers cited several factors that contributed to their burn accident, such as working too fast or carelessly, lack of awareness of chemical hazards, and wearing the wrong type of protection.

Accident prevention. A large majority of the workers who suffered chemical burns believed that the accident could have been prevented, either by their own actions or those of their employers (table 15). Wearing chemical-resistant protective equipment (including a better type) led the list of suggestions, followed by workers using safer work procedures. The workers also emphasized the need for companies to enforce safe work procedures and provide more or better safety training and labeling of products or containers.

Table 1. Industry classification of worker: Chemical burn injuries, selected States, May 1985

Industry	Percent
Total, 790 injured workers	100
Agriculture, forestry, and fishing	2
Agricultural production—crops	2
Agricultural production—livestock	(1)
Agricultural services	(1)
Mining [2]	2
Oil and gas extraction	2
Construction	12
General building contractors	2
Heavy construction contractors	2
Special trade contractors	7
Manufacturing	33
Food and kindred products	6
Lumber and wood products	1
Furniture and fixtures	(1)
Paper and allied products	1
Printing and publishing	1
Chemicals and allied products	5
Petroleum refining and related products	(1)
Rubber and miscellaneous plastics products	1
Leather and leather products	1
Stone, clay, and glass products	1
Primary metal industries	2
Fabricated metal products	5
Machinery, except electrical	2
Electrical and electronic equipment	4
Transportation equipment	3
Instruments and related products	1
Transportation and public utilities	5
Local and interurban passenger transit	1
Trucking and warehousing	2
Transportation by air	1
Transportation services	(1)
Electric, gas, and sanitary services	2
Wholesale trade	8
Wholesale trade—durable goods	3
Wholesale trade—nondurable goods	5
Retail trade	14
Building materials and garden supplies	1
General merchandise stores	2
Food stores	2
Automotive dealers and service stations	5
Furniture and home furnishings stores	1
Eating and drinking places	4
Miscellaneous retail	1
Finance, insurance, and real estate	4
Banking	1
Real estate	3
Services	19
Hotels and other lodging places	3
Personal services	2
Business services	3
Auto repair, services, and garages	2
Miscellaneous repair services	1
Amusement and recreation services	1
Health services	5
Educational services	2
Membership organizations	(1)
Miscellaneous services	(1)
Nonclassifiable	(1)

[1] Less than 0.5 percent.
[2] Excluded from the survey were coal mining, metallic mining, and nonmetallic mining and quarrying operations.

NOTE: Due to rounding, percentages may not add to 100. See appendix A for scope and method of survey.

SOURCE: State workers' compensation reports.

Table 2. Occupational classification of worker: Chemical burn injuries, selected States, May 1985

Occupation	Percent
Total, 790 injured workers	100
Executives, administrators, and managers	3
Professional and technical	4
Engineers, architects, and surveyors	1
Health treating occupations	()
Teachers, excluding postsecondary	1
Health technicians	()
Technicians, excluding health	2
Sales	2
Sales occupations supervisors	1
Commodities representatives	()
Retail sales workers	1
Administrative support (clerical)	2
Services	18
Other service occupations	18
Food service occupations	5
Waiters and waitresses	()
Cooks	2
Food counter, related occupations	()
Kitchen workers, food preparation	1
Waiters'/waitresses' assistants	()
Miscellaneous food preparation	2
Health service occupations	()
Nursing aides and attendants	()
Building service occupations	12
Building service supervisors	1
Maids and housemen	4
Janitors and cleaners	7
Personal service occupations	1
Hairdressers and cosmetologists	()
Baggage porters and bellhops	()
Personal services, n.e.c.	()
Farming, forestry, and fishing	3
Agricultural occupations	2
Related agricultural occupations	1
Precision production and craft	18
Mechanics	9
Mechanics, excluding supervisors	9
Vehicle	4
Automobile	2
Truck	1
Aircraft engine	1
Heavy equipment	1
Industrial machinery repairers	1
Machinery maintenance	1
Electrical equipment repairers	1
Electronic communications	1
Appliance and power tools	()
Heating and air-conditioning	1
Miscellaneous mechanics	1
Specified mechanics, n.e.c.	1
Not specified mechanics	1

See footnotes at end of table.

Table 2. Occupational classification of worker: Chemical burn injuries, selected States, May 1985—Continued

Occupation	Percent
Precision production and craft—Continued	
Construction trades	5
Construction supervisors	1
Construction trades, excluding supervisors	4
Brickmasons	(')
Tile setters	(')
Carpenters	(')
Drywall installers	(')
Electricians	1
Painters	1
Plasterers	(')
Plumbers, pipefitters	1
Concrete finishers	1
Glaziers	(')
Insulation workers	(')
Roofers	(')
Extractive occupations	1
Drillers, oil well	(')
Mining machine operators	(')
Mining occupations, n.e.c.	1
Precision production occupations	4
Production supervisors	1
Precision metalworking occupations	2
Machinists	1
Patternmakers, metal	(')
Precision woodworking occupations	(')
Furniture and wood finishers	(')
Precision food production occupations	(')
Butchers and meatcutters	(')
Precision inspectors and testers	(')
Inspectors, testers, graders	(')
Plant and system operators	1
Stationary engineers	(')
Miscellaneous plant and system	1
Operators, fabricators, and inspectors	21
Machine operators, excluding precision	18
Metal and plastic working machine operators	1
Lathe and turning machines	(')
Punching and stamping machines	1
Miscellaneous metalworking machines	(')
Metal and plastic processing machine operators	3
Molding and casting machines	1
Metal plating machines	2
Heat treating equipment	(')
Printing machine operators	(')
Printing machines	(')
Textile machine operators	1
Winding and twisting machines	(')
Laundry and drycleaning machines	1
Machine operators, assorted materials	9
Packaging and filling machines	1
Mixing and blending machines	1
Painting machines	1
Roasting and baking machines	(')
Furnaces, kilns, and ovens	1
Miscellaneous machines, n.e.c.	4
Machine operators, not specified	4

See footnotes at end of table.

Table 2. Occupational classification of worker: Chemical burn injuries, selected States, May 1985—Continued

Occupation	Percent
Operators, fabricators, and inspectors—Continued	
Fabricators and hand working occupations	2
Welders and cutters	()
Assemblers	1
Miscellaneous hand working	1
Production inspectors, testers, and weighers	1
Production inspectors	1
Production testers	()
Transportation and material moving	6
Motor vehicle operators	4
Truckdrivers, heavy and light	4
Material moving equipment operators	2
Material moving supervisors	()
Hoist and winch	()
Miscellaneous material moving equipment	1
Handlers, helpers, and laborers	24
Helpers, mechanics, and repairers	1
Helpers, construction and extractive occupations	1
Helpers, construction trades	1
Helpers, extractive occupations	()
Construction laborers	7
Production helpers	1
Freight, stock, and material handlers	2
Stock handlers and baggers	()
Freight, material handlers, n.e.c.	2
Garage, service station occupations	2
Vehicle and equipment cleaners	4
Laborers, excluding construction	7
Nonclassifiable	()

[1] Less than 0.5 percent.

n.e.c. = not elsewhere classified.

NOTE: Due to rounding, percentages may not add to 100. See appendix A for scope and method of survey.

SOURCE: State workers' compensation reports.

Table 3. Age and sex of worker: Chemical burn injuries, selected States, May 1985

Age and sex	Percent
Age	
Total, 790 injured workers	100
16-19 years	7
20-24 years	28
25-34 years	37
35-44 years	14
45-54 years	6
55-64 years	5
65 years or more	2
Sex	
Total, 790 injured workers	100
Men	83
Women	17

NOTE: Due to rounding, percentages may not add to 100. See appendix A for scope and method of survey.

SOURCE: State workers' compensation reports.

Table 4. Type of accident: Chemical burn injuries, selected States, May 1985

Type of accident	Percent
Total, 790 injured workers	100
Contact with radiation, caustics, and toxic or noxious substances	96
By absorption	85
Other, except by inhalation or ingestion	11
Explosions	4

NOTE: See appendix A for scope and method of survey.

SOURCE: State workers' compensation reports.

Table 5. Source of injury: Chemical burn injuries, selected States, May 1985

Source of injury	Percent
Total, 790 injured workers	100
Chemicals, chemical compounds	95
Chemicals, chemical compounds, unspecified	10
Acetones and other ketones	1
Acids	20
Acids, unspecified	6
Hydrochloric acid (includes muriatic acid)	1
Hydrofluoric acid	2
Nitric acid (includes aqua fortis)	1
Sulfuric acid (includes battery acid)	8
Acids, n.e.c. (includes acetic acid)	2
Alcohols (includes glycol, methanol, and antifreeze)	1
Alkalies	20
Alkalies, unspecified	2
Calcium hydroxide (includes lime)	9
Sodium or potassium hydroxide (includes lye and caustic soda)	9
Alkalies, n.e.c. (includes soda ash)	1
Ammonia and ammonium compounds (includes ammonium hydroxide and anhydrous ammonia)	2
Aromatic compounds (includes benzol, toluene, phenol, carbolic acid, xylene, and aniline)	1
Beauty preparations, cosmetics	()
Chlorine and its compounds	4
Cyanides or cyanogen compounds	()
Disinfectant	1
Fertilizer, n.e.c. (includes superphosphate and muriate of potash, excludes ammonium)	1
Formaldehyde and other aldehydes (includes formalin and acetaldehyde)	()
Glue, adhesive, paste	1
Halogenated compounds, n.e.c. (includes freon, fluorocarbons, refrigerants, and ethylene dibromide)	()
Insecticide, fungicide, fumigant, herbicide, n.e.c. (includes weedkillers, n.e.c.)	2
Paint, lacquer, shellac, varnish	1
Plastics, resins, etc. (includes polymer, urethane, cyanates, and silicone resin)	1
Soaps, detergents, cleaning compounds, n.e.c.	14
Solvents and degreasers, n.e.c. (includes paint thinner, paint remover, and turpentine)	9
Chemicals, chemical compounds, n.e.c.	7
Coal and petroleum products	5
Crude, fuel oil	()
Gasoline, liquid hydrocarbon compounds	3
Kerosene	1
Naphtha solvents	()
Petroleum asphalts	1
Coal and petroleum products, n.e.c.	1

() Less than 0.5 percent.

n.e.c. = not elsewhere classified.

NOTE: Due to rounding, percentages may not add to 100. See appendix A for scope and method of survey.

SOURCE: State workers' compensation reports.

Table 6. Part of body affected: Chemical burn injuries, selected States, May 1985

Part of body	Percent
Total, 790 injured workers	100
Head	55
Eye(s)	49
Face	5
Face, unspecified	1
Mouth	(1)
Face, multiple parts	3
Face, n.e.c.	1
Head, multiple	2
Neck	(1)
Upper extremities	18
Arm(s)	4
Arm(s), unspecified	1
Upper arm(s)	1
Forearm(s)	2
Arm(s), multiple	(1)
Hand(s)	6
Finger(s)	4
Upper extremities, multiple	4
Trunk	4
Abdomen	1
Back	1
Chest	(1)
Hip(s)	1
Shoulder(s)	(1)
Trunk, multiple	1
Lower extremities	14
Leg(s)	6
Leg(s), unspecified	1
Thigh(s)	2
Knee(s)	1
Lower leg(s)	2
Leg(s), multiple	1
Ankle(s)	1
Foot or feet	4
Toe(s)	1
Lower extremities, multiple	3
Multiple parts	9

[1] Less than 0.5 percent.

n.e.c. = not elsewhere classified.

NOTE: Due to rounding, percentages may not add to 100. See appendix A for scope and method of survey.

SOURCE: State workers' compensation reports.

Table 7. Activity at time of accident: Chemical burn injuries, selected States, May 1985

Activity	Percent
General activity of worker at time of accident	
Total, 790 injured workers	100
Cleaning equipment, tools, vehicles, etc.	42
Repair, adjustment, or maintenance work	22
Operating tools or equipment	4
Transferring, unloading, or storing materials, chemicals, etc.	23
Other	10
Specific activity of worker at time of accident	
Total, 790 injured workers	100
Pouring chemical or substance	22
Spraying chemical or substance	9
Pumping chemical or substance	3
Dipping object(s) into chemical or substance	5
Rubbing or applying chemical or substance by hand	9
Cleaning, n.e.c. or unspecified	14
Opening, closing, or bleeding valve	4
Connecting or disconnecting battery	6
Lifting/carrying container or other object containing chemical or substance	13
Standing or kneeling in chemical or substance	2
Standing or working near someone using chemical or substance	3
Other or unspecified	13
How often worker worked with or near chemical or substance which caused burn	
Total, 790 injured workers	100
First time worker worked with the chemical or substance	13
Daily or almost every day	58
About once a week	11
About once a month	7
Seldom—less than once a month	11
Whether worker received written or printed instructions from employer on safe work practices for handling chemicals	
Total, 790 injured workers	100
No	61
Yes	39

n.e.c. = not elsewhere classified.

NOTE: Due to rounding, percentages may not equal 100. See appendix A for scope and method of survey.

SOURCE: Survey questionnaires.

Table 8. Description of accident: Chemical burn injuries, selected States, May 1985

	Percent
How chemical or substance came in contact with worker	
Total, 790 injured workers	100
Chemical or substance contacted worker	84
Chemical or substance—	
Splashed on worker	37
Sprayed on worker	27
Dripped on worker	11
Exploded	5
Contacted worker in other manner	5
Worker touched or contacted chemical or substance (knelt in chemical, placed hand in chemical solution, etc.)	11
Unspecified method of contact	5
Length of time chemical or subetance was on skin or in eye(s)	
Total, 790 injured workers	100
Less than 1 minute	21
1 to 5 minutes	19
5 to 10 minutes	9
10 to 30 minutes	9
30 minutes or more	26
Don't know	16
Availability of eyewashes, deluge showers, or other emergency treatment facilities at jobsite	
Total, 790 injured workers	100
None available	21
Emergency eyewashes available	37
Deluge showers available	16
Other type(s) of emergency treatment available	53
If emergency facilities were available, workers' proximity to treatment	
Total, 623 injured workers	100
Less than 10 feet	35
10 to 25 feet	25
25 to 50 feet	12
50 to 100 feet	7
100 feet or more	13
Don't know	9
Whether treatment was used	
Total, 623 injured workers	100
No	16
Yes	84

Because more than one response is possible on the availability of emergency treatment facilities, the sum of the percentages exceeds 100. Percentages are based on the total number of persons who answered the question.

NOTE: Due to rounding, percentages may not add to 100. See appendix A for scope and method of survey.

SOURCE: Survey questionnaires.

Table 9. Estimated days away from work: Chemical burn injuries, selected States, May 1985

Days away from work	Percent
Total, 790 injured workers	100
No days away from work	45
1 to 5 days	32
6 to 10 days	10
11 to 15 days	2
16 to 20 days	3
21 to 25 days	2
26 to 30 days	1
31 to 40 days	2
41 to 60 days	1
Lost-time cases for which days away from work were not estimated	4
	Mean
Mean days away from work per lost-workday case	7

NOTE: Due to rounding, percentages may not add to 100. See appendix A for scope and method of survey.

SOURCE: Survey questionnaires.

Table 10. Length of hospitalization required: Chemical burn injuries, selected States, May 1985

Hospitalization required	Percent
Total, 790 injured workers	100
None	93
1 night	1
2 nights	–
3 nights	1
4 nights	–
5 nights	–
6 nights or more	3
Hospitalized cases for which length of hospitalization was not estimated	3
	Mean
Mean length (nights) of hospitalization per hospitalized case	6

NOTE: Dashes indicate that no data were reported. Due to rounding, percentages may not add to 100. See appendix A for scope and method of survey.

SOURCE: Survey questionnaires.

Table 11. Type of personal protective equipment worn by worker: Chemical burn injuries, selected States, May 1985

Type of equipment	Total	Workers' perception of chemical-resistant properties		
	Percent[1]	Chemical resistant	Not chemical resistant	Unknown or unspecified
		Percent		
Total, 790 injured workers	100			
Wearing personal protective equipment	66	31	28	7
Gloves	43	19	20	4
Rubber, plastic	29	17	8	4
Cotton, synthetic, or blend	5	–	5	–
Leather	4	–	3	1
Other or unspecified	5	2	4	–
Boots	34	10	23	2
Rubber, plastic	17	8	8	1
Leather	14	1	12	1
Other or unspecified	3	1	2	1
Apron	9	1	7	2
Rubber, plastic	2	1	1	1
Cotton, synthetic, or blend	5	–	5	1
Unspecified	2	1	2	–
Jacket or lab coat	6	5	1	–
Rubber, plastic	3	3	–	–
Cotton, synthetic, or blend	2	2	1	–
Other	1	1	1	–
Pants or overalls	12	4	7	1
Rubber	4	3	1	–
Cotton, synthetic, or blend	5	1	4	1
Other	3	1	2	1
One-piece body suit (fully encapsulated)	1	–	–	1
Glasses	18	5	10	3
Goggles	4	2	2	1
Face shield	5	2	2	1
Respirator	7	–	6	1
Barrier cream	1	–	1	1
Other	2	–	2	–

[1] Because more than one response was possible on the equipment worn, the sum of the percentages exceeds 100. Percentages are based on the total number of persons who answered the question.

NOTE: Dashes indicate that no data were reported. Due to rounding, percentages may not add to total. See appendix A for scope and method of survey.

SOURCE: Survey questionnaires.

Table 12. Use of personal protective equipment: Chemical burn injuries, selected States, May 1985

Personal protective equipment	Percent[1]
Use of chemical-resistant personal protective equipment	
Total, 790 injured workers	100
Wearing personal protective equipment identified as chemical-resistant	31
Not wearing personal protective equipment identified as chemical-resistant [2]	69
Coverage of burn area by personal protective equipment	
Total, 790 injured workers	100
Burn area not covered by protective equipment	74
Explanation:	
Proper protective equipment was not provided by employer	19
Did not think it was needed	33
Using it slows down work	2
Too uncomfortable or hot to work with it on	6
Other	5
None given	19
Burn area covered by protective equipment	26
Type of equipment:	
Gloves	9
Boots	5
Glasses	7
Goggles	1
Face shield	3
Apron	1
Jacket	2
Pants or overalls	2
Chemical-resistant properties of personal protective equipment covering burn area	
Total, 206 injured workers	100
Covered by equipment identified as chemical resistant	53
Not covered by equipment identified as chemical resistant	47

See footnotes at end of table.

Table 12. Use of personal protective equipment: Chemical burn injuries, selected States, May 1985—Continued

Personal protective equipment	Percent[1]
Burn area covered by protective equipment	
Total, 206 injured workers	100
How chemical or substance contacted skin:	
Filtered or soaked through—	12
Gloves	6
Apron, pants, overalls, or jacket	6
Filtered or soaked through seam in—	4
Gloves	2
Boots	2
Passed under or around—	80
Gloves	20
Glasses, goggles, or face shield	40
Boots	18
Apron, pants, overalls, or jacket	6
Dissolved or burned through—	10
Gloves	4
Apron, pants, overalls, or jacket	6
Other method of contact involving—	4
Gloves	4
Reasons why personal protective equipment failed to prevent burn	
Total, 206 injured workers	100
Protective equipment—	
Was in bad condition	22
Did not fit properly	15
Was not designed to protect against chemical burns	27
Was not cleaned or maintained properly	2
Was wrong style	12
Had been reused too many times	5
Other reason for failure of protective equipment to prevent burn	2
No reason given	37
Effect of personal protective equipment on burn	
Total, 206 injured workers	100
Personal protective equipment—	
Had no effect on burn	42
Reduced area burned	9
Reduced seriousness of burn	22
Made burn more serious	27

[1] Because more than one response was possible for each of the questions except those about the chemical-resistant properties of protective equipment and the effect of the equipment on the burn area, the sums of the percentages exceed 100. Percentages are based on the total number of persons who answered each question.

[2] Includes personal protective equipment which was identified as not chemical-resistant and equipment for which the worker did not provide information on chemical-resistant properties.

NOTE: Due to rounding, percentages may not add to 100. See appendix A for scope and method of survey.

SOURCE: Survey questionnaires.

Table 13. Practice and policy regarding personal protective equipment: Chemical burn injuries, selected States, May 1985

Practice and policy	Percent[1]
Who pays for workers' personal protective equipment	
Total, 790 injured workers	100
Employer	68
Worker	12
Employer and worker	7
Other	13
Information received on wearing chemical-resistant protective equipment to prevent burns	
Total, 790 injured workers	100
Where and when to wear chemical-resistant protective equipment	28
Written instructions on chemical-resistant protective equipment	7
Which types of protective equipment are chemical-resistant	5
Limitations and advantages of chemical resistant protective equipment	7
Other information	1
Did not receive information on wearing chemical-resistant protective equipment	67
Source of information	
Total, 790 injured workers	100
Supervisor, employer, or safety supervisor	28
Co-worker	5
In school or other type of classroom instruction	6
From label or printed instructions on product that caused burn	9
Printed instructions that came with protective equipment	1
Did not receive information on wearing chemical-resistant protective equipment	67

[1] Because more than one response was possible for the questions about source and nature of the information on personal protective equipment, the sums of the percentages exceed 100. For each question, percentages are based on the total number of persons who answered the question.

NOTE: See appendix A for scope and method of survey.

SOURCE: Survey questionnaires.

Table 14. Conditions or factors contributing to accident: Chemical burn injuries, selected States, May 1985

Conditions or factors workers felt contributed to accident	Percent[1]
Worksite conditions	
Total, 790 injured workers	100
Equipment in bad condition	10
Using wrong equipment	4
Working in a limited space	11
Inadequate lighting	3
No warning of hazardous substance in work area	10
Cluttered work area	5
Inadequate cleaning of work materials or work area	5
Too noisy	2
Poor ventilation	4
Other worksite conditions	8
None	58
Other contributing factors	
Total, 790 injured workers	100
Not aware chemical or substance could burn you	17
Upset, under stress, or tired	7
Inadequate labeling	7
Handling procedures for the chemical not followed	4
Co-worker's activity	4
Not paying attention to what you were doing	6
Careless in what you were doing	12
Working too fast	22
Wearing wrong type of protective equipment	12
Not given instructions on how to do job	3
Other factors	13
None	33

[1] Because more than one response was possible for worksite conditions and other contributing factors, the sums of the percentages exceed 100. Percentages are based on the total number of persons who answered each question.

NOTE: See appendix A for scope and method of survey.

SOURCE: Survey questionnaires.

Table 15. Accident prevention: Chemical burn injuries, selected States, May 1985

Actions, methods, or procedures that worker feels would have prevented accident	Percent[1]
Total, 790 injured workers	100
Wearing chemical-resistant protective equipment	46
Wearing a better type of chemical-resistant protective equipment	13
Using safer work procedures on workers' part	34
More time to do job	12
More or better safety training	15
Use of protective barriers (such as plexiglass screens, etc.)	2
Better labeling of product or chemical container	11
Having company enforce safe work procedures	18
Using different or less hazardous chemical	8
Using different or better work equipment	11
Other	5
Do not think accident could have been prevented	14

[1] Because more than one response was possible, the sum of the percentages exceeds 100. Percentages are based on the total number of persons who answered the question.

NOTE: See appendix A for scope and method of survey.

SOURCE: Survey questionnaires.

Appendix A. Scope and Method of Survey

Scope

The survey was designed to develop information on work-related chemical burns suffered by workers in the private sector (except coal and metallic and nonmetallic mining) and in broadly defined occupational categories. Within the survey scope were workers involved in accidents caused by: a) contact, by absorption and other means except ingestion and inhalation, with radiation, caustics, and toxic or noxious substances; and b) explosions in which the worker was directly involved with the chemical or substance that exploded. The selection of cases was limited to those that occurred within 120 days of the start of the reference month of May 1985.

Excluded from the survey were accidents involving propane, dry ice or radiation burns; those associated with an assault or motor vehicle accident; cases of dermatitis; and fatalities.

Method

Data were obtained from 23 participating State agencies listed in appendix B. After reviewing workers' compensation reports filed under State laws, staff members of these agencies identified a total of 790 cases meeting the above criteria. A questionnaire was mailed to a random sample of 395 cases. (See appendix C for a reproduction of the questionnaire.) At the close of the study period, 199 questionnaires had been returned, yielding a response rate of 50 percent. Cooperation was voluntary.

Nature of the data

It should be noted that there are variations among the 23 participating States in workers' compensation laws and administrative practices. For example, requirements differ as to the number of lost workdays incurred before reporting is required. And, in addition, specifications vary with regard to cases covered under the laws. These and other differences may have an impact on the selection of cases for study. It also should be noted that while the participating States span different geographic regions with a wide range of industries and occupations, the survey was not designed to yield national estimates. In addition, the reference month of May 1985 was not intended to represent an annual estimate of chemical burn cases.

Cases were classified by industry and occupation, using the Standard Industrial Classification and the 1980 Occupational Classification systems of the Bureau of the Census. Part of body affected, source of injury, and type of accident were coded using the categories of the American National Standards Institute.

The information on industry, occupation, sex, age, part of body affected, source of injury, and type of accident was obtained from the State workers' compensation reports filed by employers. Detailed descriptions of the accidents, the availability and use of personal protective equipment, and other related information were developed from the workers' responses to the questionnaire.

Weighting and estimating procedures

The findings of this survey were developed from a random sample of the 790 workers within the scope of the survey. A weight of 1.99 (which is the reciprocal of the probability of selection) was applied to each sample member's response so that the data account for the total universe of cases identified by the participating States.

To take into account bias introduced by nonresponses of the sampled workers, factors were calculated to adjust for the proportion of workers who did not return questionnaires (unit nonrespondents) and those who failed to answer selected questions (item nonrespondents).

The derivation of these factors was based on the assumption that the response distributions of the unit and item nonrespondents were the same as those for their respondent counterparts. Factors based on nonpartitioned and partitioned groups of workers were calculated to determine the best way to remove the nonresponse bias. Partitioning was based on the following characteristics: Age, sex, nature of injury, part of body affected, source of injury, type of accident, and industrial classification. It was found that the nonpartitioned approach yielded the best estimates. Ultimately a final weight was derived and applied to each case which equalled the original weight of 1.99 times the nonresponse adjustment factors.

Reliability

The estimates presented in this report are based on a sample of chemical burn cases and hence are subject to sampling errors. Standard errors were calculated to measure the extent of

errors due to sampling and are available upon request. Nonsampling errors are attributable to several sources, such as errors in defining terms or in recording or coding the data. To the extent possible, such errors were minimized by comprehensive review and editing of the completed questionnaires used to develop the information in this study.

Appendix B.
Participating State Agencies

Alaska Department of Labor,
Workers' Compensation Division
California Department of Industrial Relations,
Division of Labor Statistics and Research
Colorado Department of Labor and Employment,
Division of Labor/Statistics
Delaware Department of Labor,
Division of Industrial Affairs, OSH Statistics Section
Hawaii Department of Labor and Industrial Relations,
OSH Research Section
Indiana Department of Labor,
Research and Statistics Division
Iowa Bureau of Labor,
Research and Statistics
Kentucky Labor Cabinet,
Occupational Safety and Health Program
Maryland Department of Licensing and Regulation,
Division of Labor and Industry, Research and
Statistics Unit
Michigan Department of Labor,
MIOSHA Information Section
Missouri Department of Labor and Industrial Relations,
Division of Workers' Compensation, Statistical Section
Nebraska Workmen's Compensation Court,
Statistics Section
New Mexico Occupational Health and Safety Bureau
North Carolina Department of Commerce,
Industrial Commission
Industrial Commission of Ohio,
Division of Safety and Hygiene
Oregon Workers' Compensation Department,
Research and Statistics Section
Tennessee Department of Labor,
Division of Labor Standards, Research Section
Texas Industrial Accident Board and Department of Health
Utah Industrial Commission, Statistics Division
Virginia Department of Labor and Industry,
Division of Research and Statistics
Washington Department of Labor and Industries,
Industrial Insurance Division, Data Analysis Section
Wisconsin Department of Industry, Labor, and Human
Relations, Workers' Compensation Division
Wyoming Department of Labor and Statistics,
Research and Statistics Section

Appendix C. Survey Questionnaire

Bureau of Labor Statistics
Work Injury Report—Chemical Burns

U.S. Department of Labor

The information collected on this form by the Bureau of Labor Statistics and the State Agencies cooperating in its statistical program will be held in confidence and will be used for statistical purposes only.

This report is authorized by law 29 U.S.C. 2. Your voluntary cooperation is needed to make the results of this survey as comprehensive, accurate, and timely.

Form Approved
O.M.B. No. 1220-0047
Approval Expires 9/30/86

Survey Code 2 8 5

Case Number

Date of Accident ___ - ___ - ___

A. Describe what you were doing at the time of your injury, and how the injury occurred. (For example: Pouring chemical into mixer and it splashed into eye; cleaning restroom with spray cleaner and sprayed liquid onto hand; jumpstarting car battery when battery exploded and liquid burned chest and arms.)

B. Provide as much information as possible about the chemical or substance that burned you.

1. Name of chemical (e.g., hydrofluoric acid, sulfuric acid, etc.) ___
2. Type of substance or product (e.g., Soap, cleanser, paint, battery acid, concrete mix, lime, etc.) ___
3. Brand name of product ___

C. In your job, how often did you work with/near the chemical or substance that burned you? *(Check one.)*

1. ☐ First time you worked with this chemical or substance
2. ☐ Daily or almost every day
3. ☐ About once a week
4. ☐ About once a month
5. ☐ Seldom—less than once a month

D. Did you receive written or printed instructions from your employer on safe work practices for handling chemicals?

1. ☐ No 2. ☐ Yes

E. How long was the chemical or substance on your skin or eyes? *(Check one.)*

1. ☐ Less than 1 minute
2. ☐ 1 to 5 minutes
3. ☐ 5 to 10 minutes
4. ☐ 10 to 30 minutes
5. ☐ 30 minutes or more
6. ☐ Don't know

F. Were eyewashes, deluge showers, or other emergency treatment available at the jobsite?

1. ☐ No
2. ☐ Yes—emergency eyewashes
3. ☐ Yes—emergency deluge showers
4. ☐ Yes—other emergency treatment (For example: Sinks or other sources of water) *(Describe)* ___

IF YES:

a. How close were you to them when you were burned? *(Check one.)*

1. ☐ Less than 10 feet
2. ☐ 10 to 25 feet
3. ☐ 25 to 50 feet
4. ☐ 50 to 100 feet
5. ☐ 100 feet or more
6. ☐ Don't know

b. Did you use any of these at the time of your injury?

1. ☐ No
2. ☐ Yes *(Describe)* ___

G. Were there any conditions at the worksite which you feel contributed to your accident? *(Check all that apply.)*

1. ☐ Equipment in bad condition
2. ☐ Using wrong equipment
3. ☐ Working in a limited space
4. ☐ Inadequate lighting
5. ☐ No warning of hazardous substance in work area
6. ☐ Cluttered work area
7. ☐ Inadequate cleaning of work materials or work area
8. ☐ Too noisy
9. ☐ Poor ventilation
10. ☐ Other *(Describe)* ___
11. ☐ No worksite conditions contributed to accident

H. Were there any other factors which you feel contributed to your accident? *(Check all that apply.)*

1. ☐ Not aware chemical or substance could burn you
2. ☐ Upset, under stress, or tired
3. ☐ Inadequate labeling *(Explain)* ___
4. ☐ Handling procedures for the chemical not followed
5. ☐ Co-worker's activity *(Describe)* ___
6. ☐ Not paying attention to what you were doing
7. ☐ Careless in what you were doing
8. ☐ Working too fast
9. ☐ Wearing wrong type of protective equipment
10. ☐ Not given instructions on how to do job
11. ☐ Other *(Describe)* ___
12. ☐ No other factors contributed to accident

I. Check EACH TYPE of personal protective equipment which you were wearing when injured and *describe the materials*, for example: Leather, cotton, PVC, neoprene, nitrile, natural rubber, latex, and tyvek.

1. ☐ Face shield
2. ☐ Safety glasses
3. ☐ Safety goggles
4. ☐ Respirator
5. ☐ Gloves *(Describe material)* ___
6. ☐ Boots *(Describe material)* ___
7. ☐ Protective apron *(Describe material)* ___
8. ☐ Protective lab coat *(Describe material)* ___
9. ☐ Protective jacket *(Describe material)* ___
10. ☐ Protective pants or overalls *(Describe material)* ___
11. ☐ Protective one-piece body suit (fully encapsulated) *(Describe material)* ___
12. ☐ Barrier cream *(Describe type of cream)* ___
13. ☐ Other *(Describe equipment and material)* ___
14. ☐ Not wearing any personal protective equipment

BLS 98K (April 1985)

J. **Was any of the personal protective equipment you were wearing intended to prevent chemical burns?** *(Check one.)*

1. ☐ No
2. ☐ Yes. Indicate which equipment was intended to prevent chemical burns _____
3. ☐ Don't know
4. ☐ Not wearing personal protective equipment

K. **Who pays for your personal protective equipment?** *(Check one.)*

1. ☐ Employer
2. ☐ You
3. ☐ Both you and your employer. *(Explain)* _____
4. ☐ Don't know

L. **Was the part(s) of body where you were burned covered by personal protective equipment?**

☐ **NO: Indicate reason(s):** *(Check all that apply.)*

1. ☐ Proper protective equipment was not provided by employer
2. ☐ Did not think it was needed
3. ☐ Using it slows down work
4. ☐ Too uncomfortable or hot to work with it on
5. ☐ Personal protective equipment does not cover burn area
6. ☐ Other *(Describe)* _____

☐ **YES: Describe the equipment that covered the area where you were burned and complete a, b, and c:**

_____

a. **How did the chemical or substance burn this area?** *(Check all that apply.)*

Chemical or substance:

1. ☐ Filtered or leaked through personal protective equipment
2. ☐ Filtered or soaked through seams in fabric
3. ☐ Passed under or around personal protective equipment
4. ☐ Dissolved or burned through personal protective equipment
5. ☐ Other *(Describe)* _____

b. **Were there any other reasons why the personal protective equipment failed to prevent your burn?** *(Check all that apply.)*

Personal protective equipment:

1. ☐ Was in bad condition (torn, etc.)
2. ☐ Did not fit properly (too loose, etc.)
3. ☐ Was not designed to protect against chemical burns
4. ☐ Was not cleaned or maintained properly
5. ☐ Was wrong style. *(Explain)* _____
6. ☐ Had been reused too many times
7. ☐ Other reason(s) *(Describe)* _____
8. ☐ No other reasons

c. **What effect did the personal protective equipment have on your burn?** *(Check all that apply.)*

1. ☐ No effect on burn
2. ☐ Reduced area burned
3. ☐ Reduced seriousness of burn
4. ☐ Made burn more serious. *(Explain)* _____
5. ☐ Other *(Describe)* _____

M. **What, if any, information were you given on wearing chemical-resistant protective equipment to prevent burns?** *(Check all that apply.)*

1. ☐ Where and when to wear chemical-resistant protective equipment
2. ☐ Written instructions on chemical-resistant protective equipment. *(Describe)* _____
3. ☐ Which types of protective equipment are chemical-resistant
4. ☐ Limitations and advantages of chemical-resistant protective equipment
5. ☐ Other. *(Describe)* _____
6. ☐ Did not receive information on wearing chemical-resistant protective equipment

N. **From whom did you receive this information?** *(Check all that apply.)*

1. ☐ Supervisor, employer, or safety supervisor
2. ☐ Co-worker
3. ☐ In school or other type of classroom instruction
4. ☐ From label or printed instructions on product that burned you
5. ☐ Printed instructions that came with protective equipment
6. ☐ Other. *(Describe)* _____
7. ☐ Did not receive information on wearing chemical-resistant protective equipment

O. **Did your injury cause you to lose time from work beyond the day of injury?**

1. ☐ No 2. ☐ Yes

IF YES: How long were you (or do you expect to be) out of work? (NOTE: Do not count the day of injury, days on light duty work, normal days off, or holidays.)

_____ Workdays

P. **Have you returned to work?** *(Check one.)*

1. ☐ No—still off because of injury
2. ☐ Yes—returned to regular job duties
3. ☐ Yes—returned to restricted job duties (light duty). Indicate the number of days you were on light duty _____
4. ☐ Other. *(Describe)* _____

Q. **Did your injury require you to be hospitalized overnight or longer?**

1. ☐ No 2. ☐ Yes

IF YES: How long were you (or do you expect to be) in the hospital?

_____ Nights

R. **How do you think your accident could have been prevented?** *(Check all that apply.)*

1. ☐ Wearing chemical-resistant protective equipment. *(Describe)* _____
2. ☐ Wearing a better type of chemical-resistant protective equipment. *(Describe)* _____
3. ☐ Using safer work procedures on your part
4. ☐ More time to do job
5. ☐ More or better safety training
6. ☐ Use of protective barriers (such as plexiglass screens, etc.) *(Describe)* _____
7. ☐ Better labeling of product or chemical container
8. ☐ Having company enforce safe work practices
9. ☐ Using different or less hazardous chemical *(Explain)* _____
10. ☐ Using different or better work equipment
11. ☐ Other. *(Describe)* _____
12. ☐ Do not think it could have been prevented

Work Injury Reports

The following reports may be purchased from the U.S. Department of Commerce, National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161. Cost $9.95 for paper copy, $5.95 for fiche. Add $3 for handling fee.

- Survey of Ladder Accidents Resulting in Injuries
  NTIS Accession No. PB83 207985 (1978)
- Survey of Welding and Cutting Accidents Resulting in Injuries
  NTIS Accession No. PB83 208017 (1978)
- Survey of Scaffold Accidents Resulting in Injuries
  NTIS Accession No. PB83 208009 (1978)
- Survey of Power Saw Accidents Resulting in Injuries
  NTIS Accession No. PB83 207993 (1978)
- Accidents Involving Eye Injuries
  NTIS Accession No. PB83 182535 (1980)
- Accidents Involving Face Injuries
  NTIS Accession No. PB83 183335 (1980)
- Accidents Involving Head Injuries
  NTIS Accession No. PB83 183343 (1980)
- Accidents Involving Foot Injuries
  NTIS Accession No. PB83 182527 (1981)
- Injuries Related to Servicing Equipment
  NTIS Accession No. PB83 182543 (1981)
- Back Injuries Associated with Lifting
  NTIS Accession No. PB83 183285 (1982)
- Work-Related Hand Injuries and Upper Extremity Amputations
  NTIS Accession No. PB83 183319 (1982)

Reports which may be purchased from the BLS Publications Sales Center, Box 2145, Chicago, Il 60690

- Injuries Resulting From Falls From Elevations
  Bulletin 2195 (1984), $1.75.
- Injuries in the Logging Industry
  Bulletin 2203 (1984), $1.75.
- Injuries Resulting From Falls on Stairs
  Bulletin 2214 (1984), $1.75.
- Injuries to Construction Laborers
  Bulletin 2252 (1986), $1.75.
- Injuries to Warehouse Workers
  Bulletin 2257 (1986), $1.75.
- Injuries Involving Longshore Operations
  Bulletin 2326 (1989), $1.75.

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